

## CLAIMS

What is claimed is:

- 1     1.     A land grid array (LGA) package for clamping to an interposer socket on a  
2     printed circuit board, the LGA package comprising:  
3         a substrate;  
4         a die attached to an upper surface of the substrate;  
5         a lid attached to an upper surface of the die; and  
6         a substrate reinforcement member attached to the upper surface of the  
7     substrate and separated from the lid.
- 1     2.     The LGA package of claim 1, wherein the substrate reinforcement member  
2     comprises a ring attached to the upper surface of the substrate around the periphery of  
3     the lid.
- 1     3.     The LGA package of claim 1, wherein the substrate reinforcement member  
2     comprises at least one longitudinal bar.
- 1     4.     The LGA package of claim 1, wherein the substrate reinforcement member  
2     comprises one of Invar and SiC.
- 1     5.     The LGA package of claim 1, wherein the lid comprises one of AlSiC-9,  
2     CuW, and SiC.

1     6.     The LGA package of claim 1, wherein a coefficient of thermal expansion of  
2     the substrate reinforcement member is substantially equal to a coefficient of thermal  
3     expansion of the substrate.

1     7.     The LGA package of claim 1, wherein coefficients of thermal expansion of the  
2     substrate and the substrate reinforcement member are matched to reduce mechanical  
3     stress in the substrate and in an adhesive that attaches the lid to the upper surface of  
4     the die.

1     8.     The LGA package of claim 1, wherein the substrate reinforcement member is  
2     parallel and adjacent to sides of the lid.

1     9.     The LGA package of claim 1, wherein the substrate reinforcement member  
2     comprises four separate bars.

1     10.    The LGA package of claim 1, wherein the substrate reinforcement member has  
2     an elongated bar shape.

1     11.    In a land grid array (LGA) package comprising a substrate, a die attached to an  
2     upper surface of the substrate, and a lid attached to an upper surface of the die, a  
3     method for reducing the mechanical stress in the LGA package, the method  
4     comprising reinforcing the substrate in the LGA package by attaching a substrate  
5     support member to the upper surface of the substrate.

1 12. The method of claim 11, wherein the reinforcing the substrate in the LGA  
2 package further comprises matching a coefficient of thermal expansion of the  
3 substrate with a coefficient of thermal expansion of the substrate support member.

1 13. The method of claim 11, further comprising providing the substrate support  
2 member separated from the lid.

1 14. The method of claim 11, further comprising positioning the substrate support  
2 member around both the die and the lid.

1 15. The method of claim 11, further comprising providing the substrate support  
2 member as a continuous member extending around all sides of the lid.

1 16. A land grid array (LGA) package comprising:  
2 a substrate;  
3 a die attached to a surface of the substrate;  
4 a lid attached to a surface of the die; and  
5 a substrate reinforcement member attached to a surface of the substrate and  
6 being adapted to reduce mechanical stress in the substrate.

1 17. The LGA package of claim 16, wherein the substrate reinforcement member  
2 has a rectangular cross section.

1 18. The LGA package of claim 16, wherein the lid is adapted to move downwardly  
2 to accommodate bending of the substrate.

1     19.     The LGA package of claim 16, wherein the substrate reinforcement member  
2     extends around a periphery of the die.

1     20.     The LGA package of claim 16, wherein the substrate reinforcement member  
2     comprises two separate members that are adjacent to and separate from the lid.